**Hot or Cold Water?**

Hands-on Temperature

**Material**

Three glasses or bowls and water

**Assembly**

Fill one glass with hot water (<40 °C) hot but not scalding.

Fill one glass with ice and water.

Fill one glass with room temperature water.

**To Do and Notice**

Put one hand into the hot water.

Put other hand into the cold water.

Wait one minute.

Then put both pairs of fingers into the room temperature water.

What do you feel?

**What's Going On?**

The temperature sensors in skin sense changes in temperature, the same as most sensors in the body. The change in temperature of skin is caused by heat flow into or out of the skin. When heat flows into the skin the temperature of the skin increases and the sensor "fires" to indicate that the skin is in contact with a warmer object.

To cause heat to flow into the skin there must be a temperature difference between the object and the skin, the object must be at a higher temperature than the skin. So we experience a feeling of warmth.

In addition to the sensor for cool or hot there is an additional sensor for pain that responds to extreme temperature.

**Going Further**

Touch metal, wood and Styrofoam all at room temperature. The metal will feel the coolest and the Styrofoam the warmest even though they are at the same temperature. This is because heat flows away from the skin rapidly into the metal and slowly into the Styrofoam. The thermal sensors report these temperature changes as different temperature sensations. This is why scientists had to create thermometers to quantify temperature measurement.